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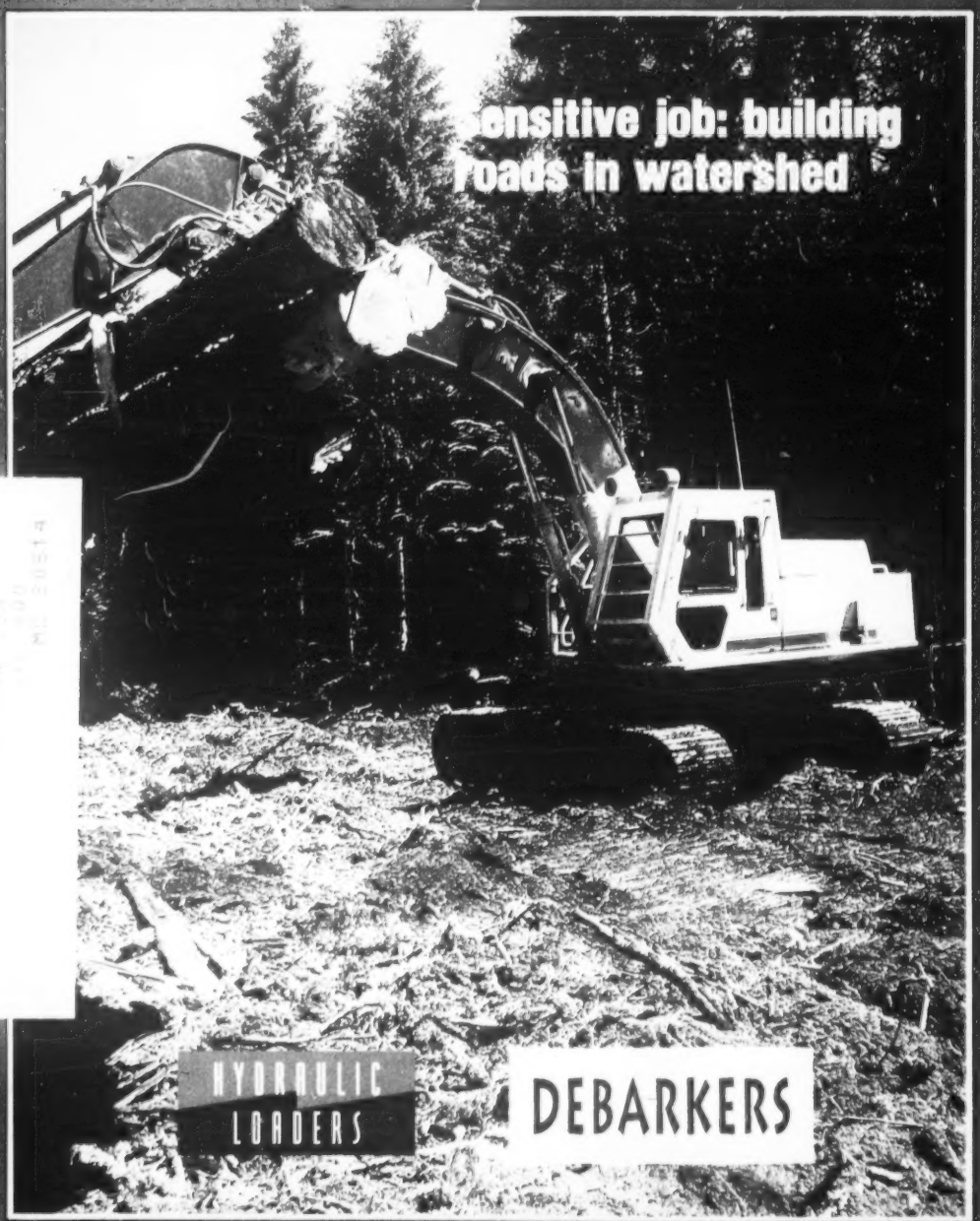

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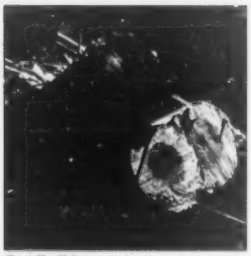

***Roadbuilder** gets back to basics. See p. 12. Photograph by Paul Harder*

HYDRAULIC LOADERS

DEBARKERS

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VOLUME 118 NUMBER 9

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U.S. has plenty of hardwood, but much of it's not for sale

Massive inventories and growth far exceeding harvest do not accurately tell the story of availability

BY PHILIP ARAMAN and JOHN TANSEY

In much of the world, especially the tropics, hardwood timber harvesting for wood products is widely thought of as timber depletion. Whether true or false, what is the hardwood situation in the United States? Does the U.S. have abundant resources of hardwood sawtimber?

Yes! Despite growing domestic and export demands for hardwood sawtimber and sawtimber products, our annual harvest remains far below the annual growth. The eastern U.S., in particular, has large amounts of hardwood. This resource is increasing—not, as some claim, decreasing. U.S. inventories of select export species could increase enough so that they make up a greater percentage of the hardwood resource as a whole.

This makes it seem that the U.S. has, and will have, plenty of hardwood to meet both domestic and export demands. However, there are constraints on harvest of the hardwoods at this time in the Southeast. We estimate a little less than 40% of the timber is actually available for cutting. Many factors, including technology, stumpage prices and land-use policies, could change this picture.

The U.S. is a major player in world export markets for hardwood logs, lumber and veneer. Exports of these products have been growing for 15 years, and the future looks bright. Hardwoods most in demand on export markets are select red and white oaks, hard maple, black walnut, black cherry, ash and yellow birch—the *select species*.

Select oaks account for more than 60% of U.S. hardwood lumber exports. The other select species make up 20%. Because export demand is so highly concentrated on few species and domestic demand for the same woods is strong, questions about timber supplies arise.

Hardwoods dominate on a little more than half of the timberland in the United States. Land producing crops of commercial timber or capable of doing so covers 23% of the nation. Most hardwoods grow in the East, where 75% of the timberland is privately owned. Only 10% of America's hardwoods are in the West.

In the East, northern and southern regions have about the same amount of growing stock, but more of the South's hardwood is sawtimber size (377 billion bd ft, compared to 338.5 billion bd ft in the North, according to a 1987 U.S. Forest Service survey).

Forest Service figures show 226 billion bd ft (International ¼-in. rule) of select hardwood sawtimber species. As noted, 60% of this is select oaks; 18% is hard maple, 11% ash, 5% cherry, 4% yellow birch and 2% walnut. Select species are increasing slightly faster than the average for all commercial hardwood sawtimber inventories.

Heavier demands of the past few years may be cutting into the oak inventory, however. And in recent years, slower growth rates have been reported among hardwoods. Inventory increases may slow.

While overall, the South has more hardwoods than the North, the North leads in select hardwood species. Many other hardwoods will become more important, including gums, yellow poplar, soft maple, hickory and cottonwood. Inventories of all of these species were greater in 1987 than in 1977.

Two grading systems are used for hardwood sawtimber. The Forest Service uses one method to define the quality of potential sawlogs in a standing tree. The top grade includes veneer logs. The National Hardwood Lumber Assn. de-

TABLE 1—Estimated quality of eastern U.S. select species sawtimber and potential output of sawn lumber by lumber grade

	Log grade			Lumber grade			
	1	2	3&4	FAS&Sel	1C	2C	Below 2C
	%						
All select hardwoods	15	24	61	12	23	27	38
Select oaks	15	24	61	12	24	27	37
Hard maple	12	23	65	11	21	26	42
Ash, walnut, cherry	15	25	60	19	25	29	27
Yellow birch	11	26	63	12	21	24	43

veloped the second one to grade lumber.

In general, top-grade FAS&Sel (Firsts-and-Seconds and Select) lumber goes to buyers of clear or almost-clear lumber, including export customers. Medium-quality lumber, graded 1C and 2C (Nos. 1 and 2 Common), goes to dimension, furniture, cabinet, flooring and other manufacturers. Lumber graded at below 2C is used for railroad ties, mine timbers, pallet parts and flooring.

Data from states was used to develop estimates of the potential output of lumber by grade in the eastern U.S. (Table 1). Lumber grade results assumed production of lumber from the distribution of logs found in the woods. However, in actual practice many smaller or lower-grade logs never leave the forests. This means the quality of logs actually sawn is higher than the inventory tallies.

We estimate that eastern U.S. hardwoods would yield about 12% top-grade lumber (FAS&Sel), 50% in 1C/2C grades and 38% below 2C. The average sawmill's profits depend on adequate and profitable markets for 1C/2C lumber.

Export markets demand select oaks above all other species. These oaks account for more than 60% of U.S. hardwood lumber exports, but are only 17% of sawtimber inventory. Adding non-select oaks to the inventory raises it to around 40%. "Non-select" oaks could be substituted for uses not needing the most rigid wood standards.

TABLE 2—Volumes of hardwood sawtimber on timberlands of the U.S. by species and region, 1987 (billion bd ft*)

Species	Region			All regions	% change 1977-1987
	North	South	West		
Select red oaks	39.8	23.7	—	63.5	—
white oaks	31.5	40.1	—	71.6	—
Other red oaks	30.7	78.9	—	109.6	—
white oaks	13.8	33.3	—	47.1	—
(All oaks)	(115.8)	(166.2)	18.6	(310.4)	(+35)
Hickory	12.7	27.9	—	40.6	+22
Yellow birch	8.6	.1	—	8.7	+11
Hard maple	38.4	2.9	—	41.3	+38
Soft maple	34.5	13.3	—	47.8	+66
Beech	14.2	7.0	—	21.2	+23
Sweetgum	1.6	38.0	—	39.6	+22
Tupelo & blackgum	1.2	29.7	—	30.9	+14
Ash	16.1	10.0	—	26.1	+43
Basswood	10.1	1.6	—	11.7	+42
Yellow poplar	12.6	40.3	—	52.9	+54
Cottonwood & aspen	29.5	3.1	19.6	52.2	+46
Black walnut	2.5	1.0	—	3.5	+60
Black cherry	11.2	.3	—	11.5	+75
Red alder	—	—	26.5	26.5	+18
Other species	29.5	25.6	17.4	72.5	+11
All species	**338.5**	**377.0**	**82.2**	**797.7**	**+33**

* International ¼-in. rule.

Ash, red alder and black walnut are also in higher relative demand than we have in our forests. Black cherry demand is proportional to potential supply. Underused species are yellow poplar, hard maple, soft maple, beech, yellow birch, hickory and others such as the gums, cottonwood and aspen (Table 2).

Availability of timber can be quite dynamic, based on changes in technology, economics and public opinion. Availability must be seriously considered along with forest inventories. This article focuses on the Southeast.

This region has abundant hardwoods—nearly 190 billion bd ft of sawtimber. Oaks account for 42%; yellow poplar makes up 15%. From bottomland forests to upland coves, the net annual growth of hardwood sawtimber exceeds removals. In the mountains, growth exceeds annual cut by more than 300%. Growth in the piedmont exceeds harvest by 89%, and by 67% in the coastal plain.

These increases in hardwood inventories have been going on for some time, according to periodic remeasurement of 28,000 sample locations scattered across the region. However, many mills find it hard to get enough sawtimber. This suggests possible physical, economic and societal barriers that limit availability.

Some physical barriers are obvious: steep, rugged terrain in the mountains and year-round swamps near the coast. Some stands are too far from existing, usable roads. Hardwoods growing in primarily softwood stands may be uneconomical to log. Timber in built-up areas, along streams or lakes and near major highways is often off-limits to loggers. Public forests frequently are not managed for timber production.

Land-use conflicts, landowner attitudes and public opinion all heavily influence timber management. Land ownership is diverse in the Southeast, but much of the timberland is owned by individuals and corporations not involved with forest products. All of these restraints require the true timber inventory to be discounted.

In the mountains, discounting reduces the amount of hardwood sawtimber potentially available to 11.5 billion bd ft—just 25% of the inventory. In the piedmont, discounting reduces the 63-billion-bd-ft inventory to 31.3 billion, or slightly less than half. Similarly, eliminating unharvestable stands in the coastal plain reduces an inventory of 80.2 billion bd ft to 31.7 billion.

Thus, in the Southeast as a whole only about 74 billion bd ft of hardwood sawtimber appears to be available. This is not the actual hardwood sawtimber volume available, however. The criteria applied in the discounts were rigorous and extensive. Demand for timber products and for specific species, available harvesting techniques and equipment and land-use policies can change rapidly.

Demands on the hardwood forests are predicted to increase. Pulpwood and, to a lesser degree, fuelwood harvests could rise substantially, primarily in low-grade and small-diameter stands. Demand for sawlogs, veneer logs and others will also increase.

At both federal and state levels, work continues in three areas to respond to rising demand and increasing environmental concerns: improving forest management techniques, raising timber utilization standards and developing new products or improved markets for low-grade trees and non-select species. ■

THE AUTHORS are with the Southeastern Forest Experiment Station, Brooks Forest Products Center, Virginia Tech University, Blacksburg, Va., and Asheville, N.C. This article is adapted from a paper given at a conference on hardwood utilization and trade in Taipei, Taiwan, in June 1990.

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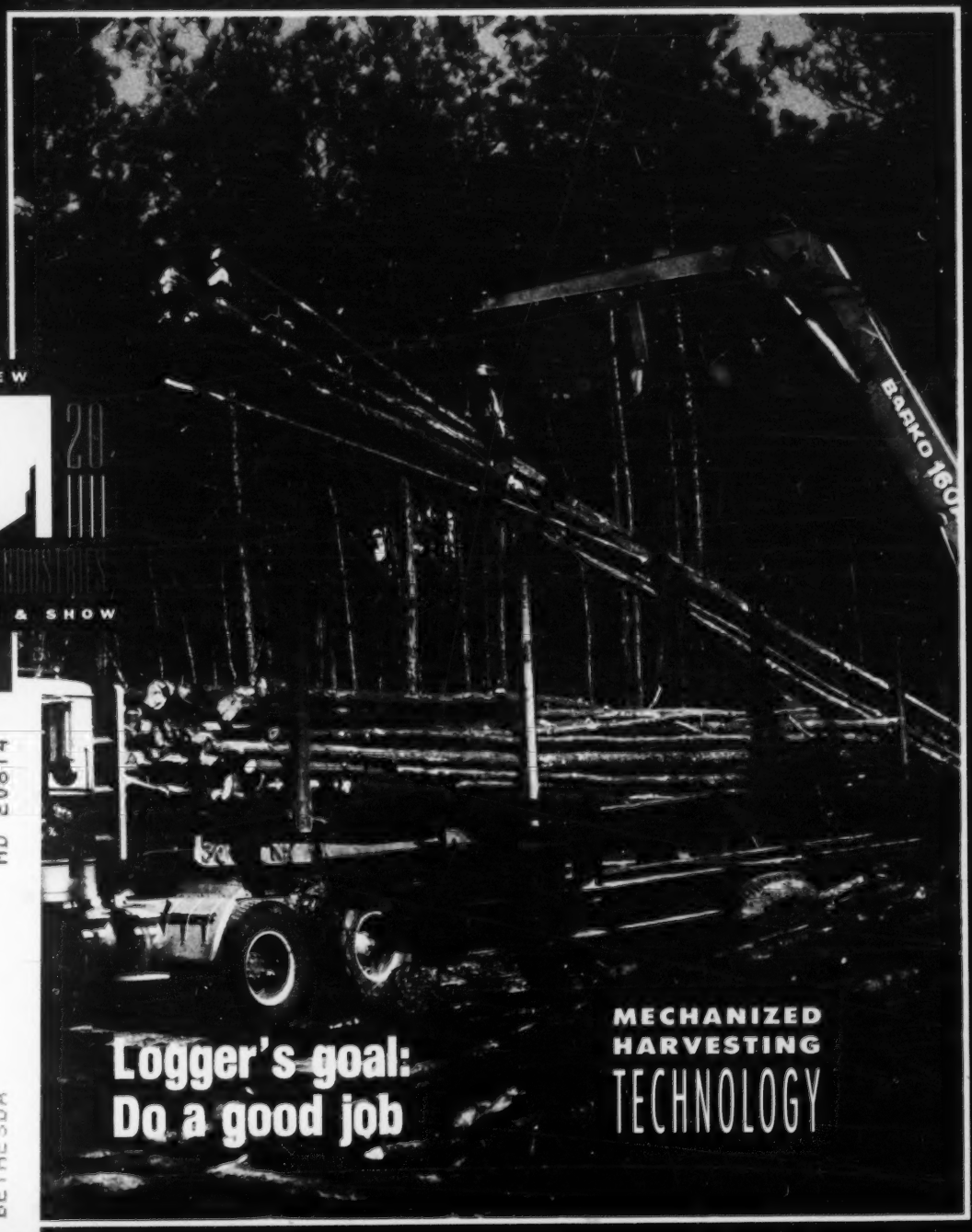

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Logger's goal: Do a good job

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Few surprises found among top 1990 lumber producers

A year of painstaking work to rank North America's major lumber producers yielded few surprises. Weyerhaeuser Co. retained—by a considerable margin—the title of North America's biggest sawmiller.

Second and third places on the list, compiled by FOREST INDUSTRIES editors after an exclusive survey of companies throughout the United States and Canada, produced a flip-flop. Georgia-Pacific Corp.—third in 1989—overtook Louisiana-Pacific Corp. for second place. G-P's 2.66 billion bd ft of lumber cut in 1990 was well behind Weyerhaeuser's 2.92 billion. L-P cut nearly 2.2 billion bd ft in dropping from second in 1989 to third in 1990.

The largest Canadian lumber producer, Canfor Corp., retained its fourth-place rank in both 1989 and 1990. It's worth noting that Canfor produced 1.43 billion bd ft in only 11 mills. Louisiana-Pacific had 56 sawmills operating in 1990, followed by Georgia-Pacific with 46 and Weyerhaeuser with 35.

Fifth was another Canadian, Weldwood, which churned out 1 billion bd ft in only eight sawmills. WTD Industries' 23 mills cut 996 million bd ft to take sixth place in the survey.

Rounding out 1990's top 10 were West Fraser Timber (993 million bd ft), Sierra Pacific Industries (967 million), International Paper Co. (880 million) and Fletcher Challenge Canada (863 million).

Yes, the numbers are for 1990, not 1991. It takes most producers some time to report figures from all of their mills, so the annual survey is always a year behind. Typically, the 1991 survey accounted for a little more than 80% of 1990's estimated total softwood and hardwood lumber output in North America—nearly 69.3 billion bd ft.

The survey is just part of the wealth of information found in *Forest Industries 1991-92 North American Factbook*—more than 350 pages of information about the solid-wood industry. The volume provides production data for more than 750 lumber producers, and capacity and production figures for major panel producers (structural and nonstructural) in both countries.

You can order the $157 *Factbook* by phone, fax or mail. Call 408/848-5296; fax 408/848-5784; write to FOREST INDUSTRIES Books, P.O. Box 7339, San Francisco, Calif. 94120-7339. Mention order number 483.

Factbook survey data revealed output declines among the largest sawmillers. North America's top 100 companies in 1990 cut a combined 41.6 billion bd ft of softwood and hardwood lumber, about 5.5% less than in 1989. And only five companies cut more than 1 billion bd ft, compared to nine in 1989.

The 100th-largest producer's volume has also fallen, from more than 128 million bd ft in 1987 and 1988 to 115 million in 1990.

The 100 largest sawmillers cut 60% of all lumber produced in North America in 1990. This number shows two things: a relatively small number of companies cut a dominant share of the continent's lumber—but there are plenty of small independents whose combined market share is large.

FOREST INDUSTRIES' survey covered 765 lumber producers. We know there are hundreds more, most of them small mills. Our goal was to get reports from mills with annual output as low as 1 million bd ft. Several of the individual sawmills in the survey cut more than 200 times as much. ■

Top 20 producers, U.S. and Canada

Company name & headquarters	# of mills	1990 production (million bd ft)	Rank in 1989
1. Weyerhaeuser Co. Tacoma, Wash.	35	2,921	1
2. Georgia-Pacific Corp. Atlanta, Ga.	46	2,664	3
3. Louisiana-Pacific Corp. Portland, Ore.	56	2,199	2
4. Canfor Corp. Vancouver, B.C.	11	1,431	4
5. Weldwood of Canada Ltd. Vancouver, B.C.	8	1,011	9
6. WTD Industries Inc. Portland, Ore.	23	996	7
7. West Fraser Timber Co. Ltd. Vancouver, B.C.	8	993	8
8. Sierra Pacific Industries Redding, Calif.	9	967	10
9. International Paper Co. Purchase, N.Y.	11	880	12
10. Fletcher Challenge Canada Ltd. Vancouver, B.C.	8	863	6
11. Champion International Corp. Tacoma, Wash.	9	819	16
12. MacMillan Bloedel Ltd. Vancouver, B.C.	9	796	13
13. Boise Cascade Corp. Boise, Idaho	15	783	11
14. Slocan Forest Products Ltd. Richmond, B.C.	7	680	15
15. Westar Timber Ltd. Vancouver, B.C.	5	626	20
16. Doman Industries Duncan, B.C.	7	619	21
17. RSG Forest Products Inc. Kalama, Wash.	5	604	14
18. Northwood Pulp & Timber Ltd.* Prince George, B.C.	5	598	5
19. Donohue Inc. Quebec, Que.	8	595	17
20. Pope & Talbot Inc. Portland, Ore.	5	586	22

* Northwood Pulp & Timber 1990 production was included under parent company Noranda Forest Inc.
NOTE: Companies are ranked according to data gathered by FOREST INDUSTRIES.

One log unloading crane does the job of two

Progress Industries Inc. has introduced a 175-ft, 20-ton log crane for two-bite tree-length log unloading. The new crane allows storage of over 12,000 cords, enabling it to do the job of two smaller cranes and resulting in reduced maintenance, storage and manpower. Progress Industries also manufactures crane models in lengths of 75, 100 and 125 ft, plus 150-ft, 20-ton and 150-ft, 45-ton models. **Progress Industries Inc.** Circle No. **28**

Swamp skidder

The Ronen track swamp skidder is based on the firm's track swamp harvester which has been in production for over four years. The 210-hp skidder has a high ground clearance of 36 in. and high-flotation, 36-in. x 15.5-ft tracks. It has been purpose-built for swamp skidding using an economical and rugged D-6 size bulldozer tractor undercarriage. A front high-elevated final drive system has good weight distribution and fewer final drive and sprocket problems from operating in mud and water.

With a high front-track approach angle, the skidder has a climbing action instead of a burrowing tendency in soft ground conditions such as conventional designs have. It features proven components for durability and easy maintenance. Ronen's swamp skidder is available in a high-ground, mountainous model, and can come with different model grapples or a knuckleboom loader and clambunk. **Ronen Manufacturing.** Circle No. **29**

Grade mark reader

UIP-Forestline has recently installed an Intellescan Custom Classic grade mark reader at Boise Cascade's White City, Ore., pine mill. The reader features nine-color grader tracking complete with color management report; push-button interface for trimmer console hook-up; custom programming for cut-in-two, cut-outs and scale-off; and parameter changes for on-line adaptation, maintenance and troubleshooting.

"All parties are extremely pleased with the system's operation and flexibility," the company reports. **United Industrial Products Ltd.** Circle No. **30**

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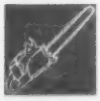

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Panels slide again; upturn seen for 1992

U.S. producers weathered tough markets last year, which in most cases returned output to mid-1980s levels; optimism tied to housing rebound

Sources agree 1992 should be a turnaround year for the wood-based panel industry in the United States, which saw production and shipment figures slip in 1991 for the second year in a row. Numbers were down in all major product categories.

The good news to be extracted from this scenario is that the downward movement was relatively modest, ranging from 1% for medium-density fiberboard to 8% for structural panels. Figures in the table below draw a 10-year profile. In summary:

- Production of structural panels (softwood plywood, oriented strand board, waferboard and oriented waferboard) dropped 8% in 1991 to an estimated 24.3 billion ft² (⅜-in. basis), continuing a slide that began after a record level of 27.2 billion ft² was attained in 1988. The rate of decline rose in 1991 from 0.6% in 1990.
- Particleboard shipments in 1991 slid 6% to an estimated 3.57 billion ft² (¾-in. basis). The record of 3.86 billion ft² was set in 1989, although shipments also exceeded 3.8 billion ft² in 1988 and 1990. The decline is becoming more precipitous: 1990 shipments were a little over 1% below the 1989 level.
- MDF is almost a growth industry by comparison. Shipments in 1991 edged downward 1% to an estimated 940 million ft² (¾-in. basis) after dropping 2% the year before. The record year for MDF shipments also was 1989; shipments have exceeded 900 million ft² since breaching that mark in 1988.
- Hardboard shipments dropped below 5 billion ft² (⅛-in. basis) in 1991 for the first time in over a decade. Estimated shipments slipped 3% to 4.9 billion ft², after also declining 3% the year before. Shipments have tumbled since the record of 7.3 billion ft² was set in 1983.

Structural panels

While the structural panel industry found itself in a slightly deeper hole last year than predicted (the American Plywood Assn. was looking for 25 billion ft², ⅜-in. basis, at this time in 1991), past and current projections agree that an upturn will occur in 1992.

The APA is estimating production this year will reach 26.5 billion ft², based on housing starts of 1.15 million units. This will be an increase of 9%, bringing output back to levels typical of those in 1989 and 1990.

While structural panel consumption in the average single-family home has increased in a decade from 5600 to 8433 ft², APA president Bill Robison is quick to point out the industry doesn't have all of its eggs in the housing basket. Markets which are exclusive of new residential construction have grown to represent over 63% of struc-

U.S. panel production, 1982-1991 (thousand ft²)

Year	Structural panels (⅜-in. basis)	Particleboard[1] (¾-in. basis)	MDF[1] (¾-in. basis)	Hardboard[1] (⅛-in. basis)
1991[2]	24,300,000	3,570,000	940,000	4,890,400
1990	26,337,188	3,806,018	949,915	5,025,326
1989	26,490,320	3,858,226	970,001	5,195,651
1988	27,202,822	3,829,021	938,717	5,117,857
1987	27,001,000	3,705,560	899,282	5,457,508
1986	25,632,830	3,602,757	780,598	5,822,328
1985	22,838,170	3,330,517	684,593	6,300,146
1984	21,967,917	3,195,586	633,974	6,837,118
1983	20,821,342	3,009,343	604,323	7,302,702
1982	16,402,554	2,393,066	446,157	5,586,918

[1] Shipments; [2] Estimated. SOURCES: American Plywood Assn., National Particleboard Assn., American Hardboard Assn.

tural panel consumption in the United States.

Growth in all market areas is predicted for 1992, but the anticipated recovery in housing is critical to the turnaround expected by the structural panel industry. If APA expectations are met, new residential construction will grow 16% to 8.6 billion ft². Addition of 430 million ft² expected to be consumed in mobile home fabrication brings the projected 1992 residential total to 9.1 billion ft², an increase over 1991 of 15%.

Projected 1992 structural panel consumption in other markets is penciled out this way: remodeling, up 7% to 4.8 billion ft²; industrial, up 2% to 6 million ft²; nonresidential construction, up 1% to 3.85 billion ft²; distribution, up 4% to 2.5 billion ft²; and exports, up 15% to 1.6 billion ft².

APA market development activities continue to focus on offshore targets. Seven APA panel mills and three American Wood Systems glulam plants have received Japanese government approval to apply the Japan Agricultural Standard (JAS) mark on their production.

Super House will be complete in the fall. Funded by the Foreign Agriculture Service, U.S. Department of Agriculture, the project was organized by the Alliance for Wood Products Exports, which assigned responsibility for construction to APA.

Two other international demonstration projects are underway in Spain: California Village, a townhouse development, and the American Spirit Home, to be part of the United States pavilion at the World's Fair in Barcelona.

Particleboard and MDF

Information from the National Particleboard Assn. indicates future capacity increases in these industry segments will be less than suggested in this report a year ago. Two new mills originally scheduled for startup in 1993 have been put on an indefinite project hold: Mill's Pride Inc., Waverly, Ohio, particleboard, 68 million ft² (¾-in. basis) annual capacity, and Reincorp International Inc., Washington County, Ala., MDF, 100 million ft² (¾-in. basis) annual capacity.

Two other mills are on schedule, and another has been completed. Willamette Industries Inc.'s new 100 million-ft² MDF plant at Bennettsville, S.C., is on line. Paris Fiber Inc., Paris, Tenn., should be operational in late 1992 with a 90 million-ft² MDF facility. Masonite Corp. division of International Paper Co. is scheduled to begin construction of an additional particleboard line at Waverly, Va., in 1993, with startup in 1994. The project will add 100 million ft² to annual capacity.

Hardboard

Hardboard industry leaders are bullish on 1992 opportunities, looking for a good rebound in housing starts, reported American Hardboard Assn. executive vice president C. Curtis Peterson. Continued low mortgage rates, election year incentives and backed-up demand for housing and consumer products will contribute to the anticipated improvement, Peterson said.

AHA responded to the slump in 1991 by launching an expanded promotion program. The program consisted of advertising and promotion activities in support of a hardboard "home of the year" competition.

Hardboard siding shipments in 1991 were off 5% from the year before, totaling 2.9 billion ft² (⅛-in. basis). ■

Panel output levels decline in Canada

CANADIAN PRODUCTION of wood-based panels fell sharply last year. Estimates from Statistics Canada, based on 11-month totals, show construction plywood output for the year dropped 13% to 1.7 million m³, equal to about 1.9 billion ft² (⅜-in. basis).

Waferboard and OSB production plummeted 19% to 1.6 million m³ (about 898 million ft², ¾-in.) and particleboard skidded 8% to just over 1 million m³ (about 590 million ft², ¾-in. basis).

This curtailment occurred after production the previous year declined about 10% in all three categories. Construction plywood production in 1991 fell to its lowest point since the housing collapse of the early 1980s. Plywood output exceeded 2 million m³ in 1987 through 1989 and was only slightly below that mark in 1980. Figures recorded by the other two segments of the industry were typical of mid-1980s performance.

Canadian panel production, 1984-91 (m³)

Year	Const. plywood	Particleboard	Waferboard/OSB
1991'	1,722,346	1,046,349	1,588,218
1990	1,971,541	1,146,018	1,965,827
1989	2,165,356	1,279,414	2,159,961
1988	2,161,658	1,213,364	1,646,663
1987	2,229,000	1,355,107	1,607,171
1986	1,876,896	1,139,253	1,347,638
1985	1,957,887	1,047,500	1,336,566
1984	1,846,369	843,346	1,190,254

'Estimated. SOURCE: Statistics Canada

The softwood plywood industry continued to feel "the sharp sting of the world economic recession" in 1991, according to the Council of Forest Industries of British Columbia. COFI's 11 member mills account for nearly three-quarters of Canada's softwood plywood production.

COFI mills reported declines in both domestic and export shipments for the second year in a row. Canadian shipments, at 1.3 billion ft² (⅜-in. basis), dropped 15%; export shipments of 258 million ft² were off a less-severe 4% from the 1990 mark.

Although the United Kingdom retained its position as the largest export market for COFI plywood, shipments to that market declined 11% and were barely ahead of Japan, now the fastest-growing export market for COFI plywood. Shipments to Japan in 1991 leaped 20% to 73 million ft² (⅜-in. basis).

"It has been another tough year for our industry," observed Peter Metcalfe, COFI plywood market development manager. "But despite the impact of two plant closures, the COFI plywood sector is poised to take advantage of any upturn in construction activity in Canada.

"There's an increasing focus on product improvement and development, on COFI quality brand recognition and on targeting our strategies more directly toward markets where COFI plywood's quality and features are demanded," he said. ■

EVENTS

APRIL

20-23—Log Imports and Introduced Forest Pests into the Pacific Northwest, Oregon State University, Corvallis, Ore. Conference Assistant, 503/737-2329.

22-24—Forest Farmers Assn. conference and annual meeting, Callaway Gardens Inn, Pine Mountain, Ga. FFA, 404/325-2954.

23-25—Mid-Atlantic Woodworking & Furniture Supply Show, Atlantic City, N.J. Trade Shows, 704/459-9894.

24-25—Northeastern Loggers' Congress & Equipment Exposition, Bass Park Complex, Bangor, Maine. George Mitchell, Northeastern Loggers' Assn., 315/369-3078.

30-May 1—Forest Sector, Trade and Environmental Impact Models, University of Washington, Seattle. 206/685-2315.

MAY

4-6—Wood Technology Short Course, Virginia Tech, Blacksburg. Fred Lamb, 703/231-7256.

6-7—Marketing Forest Products of the Pacific Rim, Fundacion Chile Conference Center, Santiago, Chile. Jay Gruenfeld Associates, 206/242-3551.

7—Hardwood Markets: the Export Alternative, Clement Center, Hickory, N.C. Larry Jahn, North Carolina Cooperative Extension Service, 919/515-5579.

7-9—Prince George Regional Forest Exhibition, Exhibition Park, Prince George, B.C. Trudy Swann, 604/563-8833.

11-13—Wood Finishing Seminar, Grand Rapids, Mich. Daniel Cassens, Purdue University, 317/494-3644.

13-15—Western Dry Kiln Assn. annual meeting, Harrah's Hotel, Reno, Nev. Charles J. Kozlik, 503/681-9125.

14-15—Electric Technologies for Drying of Wood, SUNY College of Environmental Science and Forestry, Syracuse, N.Y. 315/470-6891.

15-16—Expo Richmond '92, Virginia State Fairgrounds, Richmond, Va. 804/737-5625.

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